IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re the Application of: **Masato IWANAGA et al.** Art Unit: **1795**

Application Number: **10/584,266** Examiner: **Claire L. Rademaker**

Filed: **June 23, 2006** Confirmation Number: **5652**

For: **NONAQUEOUS ELECTROLYTE SECONDARY BATTERY**

Attorney Docket Number: **062698**
Customer Number: **38834**

SUBMISSION OF APPEAL BRIEF

Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

September 8, 2009

Sir:

Applicants submit herewith an Appeal Brief in the above-identified U.S. patent application.

Attached please find a check in the amount of $540.00 to cover the cost for the Appeal Brief. If any additional fees are due in connection with this submission, please charge Deposit Account No. 50-2866.

Respectfully submitted,

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APPEAL BRIEF FOR THE APPELLANT

Ex parte Masato IWANAGA et al. (Applicant)

NONAQUEOUS ELECTROLYTE SECONDARY BATTERY

Application Number: 10/584,266

Filed: June 23, 2006

Art Unit: 1795

Examiner: Claire L. Rademaker

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(I) REAL PARTY IN INTEREST

The real party in interest is Sanyo Electric Co., Ltd., by an assignment recorded in the U.S. Patent and Trademark Office on June 23, 2006, at Reel 018072, Frame 0053.

(II) RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to Appellant, Appellant's legal representative, or assignee that will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(III) STATUS OF CLAIMS

Pending claims 1-8 are pending in the present application, and stand rejected.

(IV) STATUS OF AMENDMENTS

A final rejection was issued on March 5, 2009. Appellant filed a Response under 37 C.F.R. §1.116 on June 4, 2009. An Advisory Action was issued dated June 22, 2009, in which the Examiner maintained that Appellant had failed to persuasively demonstrate unexpected results associated with the claimed invention. A Notice of Appeal was subsequently filed by Appellant on July 6, 2009.

(V) SUMMARY OF THE CLAIMED SUBJECT MATTER

Rejected claims 1-8 are grouped and represented by independently claimed subject matter of claim 1.

The limitations of claim 1 are described in the specification in at least the following locations:

Claim	Specification
1. (Original) A nonaqueous electrolyte secondary battery comprising:	Throughout
a negative electrode constituted of a carbonaceous material permitting reversible insertion and desorption of lithium;	Page 2, lines 11 – 15 Page 6, lines 11 – 13
a positive electrode permitting reversible insertion and desorption of lithium;	Page 6, lines 4 – 9
a separator separating the positive electrode and negative electrode from each other; and	Page 5, line 1 Page 8, lines 32 – 34
a nonaqueous electrolyte composed of an organic solvent with a solute of lithium salt dissolved therein;	Page 5, lines 3 – 4
said nonaqueous electrolyte containing vinylene carbonate and di(2-propynyl) oxalate,	Page 4, lines 5 – 10
and said vinylene carbonate being added in an amount of 0.1 to 3.0% by mass, and said di(2-propynyl) oxalate in an amount of 0.1 to 2.0% by mass, relative to the mass of said nonaqueous electrolyte.	Page 4, lines 5 – 10 Page 5, lines 5 – 8

(VI) GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1 and 8 are rejected under 35 U.S.C. §103(a) as being unpatentable over Hamamoto et al. (JP 2002-124297) in view of Noh (US 2004/0101762).

Claim 2-6 are rejected under 35 U.S.C. §103(a) as being unpatentable over Hamamoto et al. in view of Noh as applied to claim 1 above, and further in view of Kanekiyo et al. (JP 2002-313419).

Claim 7 is rejected under 35 U.S.C. §103(a) as being unpatentable over Hamamoto et al. in view of Noh, as applied to claim 1 above, and further in view of Kinoshita et al. (US 2004/0091780).

(VII) ARGUMENT

All arguments are directed to the rejection of claim 1, which is rejected under 35 U.S.C. §103(a) as being unpatentable over Hamamoto et al. (JP 2002-124297) in view of Noh (US 2004/0101762). Appellant submits that claims 2 to 8 stand or fall with claim 1.

Appellant respectfully submits that one skilled in the art at the time of the invention would not have made the asserted combination because there would have been no expectation of success. In particular, Appellant submits that the references themselves provide reasons for not making the asserted combination.

In order to establish a *prima facie* case of obviousness, three basic criteria must be met. First, the prior art reference (or references when combined) must teach or suggest all the claim limitations. Second, there must be some apparent reason or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Finally, there must be a reasonable expectation of success. (Manual of Patent Examining Procedure (MPEP) §2142). The suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based merely on Appellant's disclosure.

Appellant respectfully submits that one skilled in the art at the time of the invention would not have made the asserted combination because there would have been no expectation of success. In particular, Appellant submits that the references themselves provide reasons for not making the asserted combination.

The present invention is a non-aqueous secondary battery, of which the electrolyte contains vinylene carbonate (VC) and di(2-propynyl) oxalate (D2PO) in specified ratio. The present invention utilizes the combination of VC and D2PO, the VC being added in an amount of 0.1 to 3.0% by mass, and the D2PO in an amount of 0.1 to 2.0% by mass, relative to the mass of said nonaqueous electrolyte.

As a result of the claimed structure of the claimed battery, the battery shows remarkably superior charge-discharge cycling characteristics at high temperature, and little swelling.

The Examiner asserts that Hamamoto describes most of the claimed invention but for the claimed amount of VC. The Examiner concludes that it would have been obvious to add the 0.1-50 wt% of VC of Noh to the nonaqueous electrolyte of Hamamoto et al. "in order to inhibit swelling at high temperature and to improve cycle life characteristics of the battery (paragraph [0020])."

Appellant first submits that there is no suggestion to use the amount of VC of Noh in the nonaqueous electrolyte of Hamamoto. Appellant submits that the advantages asserted by the Examiner to be attributed to the VC of Noh are incorrectly attributed to the VC of Noh.

Noh discloses an electrolyte ester-based or ether-based organic solvent, lithium salt, an additive compound having at least two carbonate groups and, only optionally, a potentially wide range of 0.1~50 wt% of VC in the electrolyte. The stated effect of Noh is enhancing electrochemical characteristics and preventing swelling of the battery.

Appellant particularly notes that the "additive compound" referred to in Noh is the compound having at least two carbonate groups, which does not include VC. VC is introduced

in paragraph [0039] of Noh as a "secondary additive compound", and should not be confused with the "additive" of Noh. Thus, any attribution to the "additive" of Noh is attribution to the compound having at least two carbonate groups, which does not include VC.

The Examiner concludes that it would have been obvious to add the 0.1-50 wt% of VC of Noh to the nonaqueous electrolyte of Hamamoto et al. in order to inhibit swelling at high temperature and to improve cycle life characteristics of the battery (paragraph [0020]).

However, Appellant submits that a person of skill in the art would have recognized by reading Noh that it is not the VC in the electrolyte of Noh that reduces swelling of a secondary battery. Appellant notes that Comparison between Examples 2 and 5 with respect to Thickness variation ratio in Tables 1 and 2 of Noh shows that the VC itself may easily be seen as enhancing swelling, rather than reducing swelling. Comparison between Comparative Examples 2 and 3 also shows the same tendency. Furthermore, the battery of Example 6 shows larger swelling than that of Example 7, in spite of the electrolyte containing more VC than electrolyte of Example 7.

Appellant submits that those comparisons would have clearly demonstrated to the person of skill in the art that adding VC to electrolyte of a secondary battery does not effect to swelling of the battery.

The Examiner disagrees with the above argument, and asserts that Examples 2 and 5 of Noh are not comparable because multiple variables are varied simultaneously. The Examiner specifically notes that Example 2 contains VC while Example 5 does not, while both also contain different amounts of additives "Formula (5)" and "Formula (6)" (Tables 1 & 2 of Noh). Similarly, Examples 6 and 7 are not comparable because Examples 6 & 7 contains different

amounts of additives "Formula (5)" & "Formula (6)" in addition to different amounts of VC. The Examiner asserts that Comparative Examples 2 & 3 of Noh are not comparable because Comparative Example 2 contains VC while "Comparative Example 3 {sic, note below} contains VS".

Appellant first submits that the Examiner's conclusion was based on an incorrect printing of Noh. Appellant cites Table 1 of Noh as it was filed, obtained by PAIR and included in Evidence Appendix, which surprisingly shows that electrolyte of Comparative Example 3 does not contain vinyl sulfone (VS). Table 1 of the Publication appears roughly edited and is easily misread, and it is unclear which electrolyte of Comparative Example contains 0.25 wt% of VS. It is Comparative Example 4 of which the electrolyte contains VS, but the Examiner misread that the electrolyte of Comparative Example 3 contains VS.

More importantly, the Examiner's above notes actually add persuasiveness to Appellant's argument. It is the compound having at least two carbonate groups, an VC is not such a compound, that is the varied factor in the data of Noh that is the determinant as to the positive results of the invention of Noh. The VC is essentially "long for the ride" in Noh, and is not a determinant as to the positive effects of Noh.

The above comparison in Noh shows that addition of VC alone into electrolyte does not control swelling.

Therefore, those skilled in the art would not have attributed the VC of Noh to the positive effects therein, and would have had no reason to consider the amounts of VC in Noh as possibly enhancing the nonaqueous electrolyte of Hamamoto et al. to inhibit swelling of the battery.

Appellant asserts that a showing of unexpectedly superior results associated with the claimed invention rebuts any possible obviousness rejection.

The present invention is a non-aqueous secondary battery, of which the electrolyte contains 0.1~3 wt% of VC and 0.1~3 wt% of D2PO. Appellant submits that the present invention is associated with unexpectedly superior results associated with the claimed combination of VC and D2PO in the claimed amounts.

Table 1 of the specification demonstrates that if the content of **either** VC **or** D2PO is not within the range of claim 1, for instance, content of VC or D2PO is 0, capacity and charge-discharge characteristics are not enhanced and swelling is not reduced.

To illustrate the results of the variation of VC, the specification includes Examples 1-4, showing the relative effects of VC at 0.1%, 1%, 2%, and 3%, compared with Comparative Example 3 (VC at 0%) and Comparative Example 4 (VC = 4%). Each of these amounts of VC is matched with 1.0% of D2PO, which is in the middle of the claimed range of D2PO of 0.1 to 2%. In the above-noted data set, data points are included below the claimed VC range of 0.1 to 3% (0%), at the bottom of the claimed range ((0.1%), middle (1% and 2%), top of the claimed range (3%), and above the claimed range (4%).

Similarly, the specification includes Examples 5-7, showing the relative effects of D2PO at 0.1%, 1% and 2%, each combined with 1% of VC, compared with Comparative Example 5 (D2PO = 0%, VC = 1%), Comparative Example 2 (D2PO = 0%, VC = 2%), and Comparative Example 6 (D2PO = 3%, VC = 1%). Therefore, data points included in the above-noted data set

include those below the claimed D2PO range of 0.1 to 2% (0%), at the bottom of the claimed range ((0.1%), in the middle of the claimed range (1%), at the top of the claimed range (2%), and above the claimed range (3%).

Such evidence of unexpected results should rebut the assertion of obviousness under 35 U.S.C. §103(a).

The Examiner asserts in the Advisory Action dated June 22, 2009 that Appellant's assertion of unexpectedly superior results is not persuasive because "results must compare the claimed invention with the closest prior art."

Appellant agree with the principle that evidence of unexpected results must compare the claimed invention with the closest prior art. However, MPEP 716.02(e)(III) clearly notes that, "applicant is not required to compare the claimed invention with subject matter that does not exist in the prior art. *In re Chapman*, 357 F.2d 418, 148 USPQ 711 (CCPA 1966) (Requiring applicant to compare claimed invention with polymer suggested by the combination of references relied upon in the rejection of the claimed invention under 35 U.S.C. 103 "would be requiring comparison of the results of the invention with the results of the invention." 357 F.2d at 422, 148 USPQ at 714.)."

In the above-noted presentation of evidence of unexpectedly superior results, Appellant has compared

(a) the effects associated with batteries that included structure associated with the cited references but that would not include all the claimed limitations with respect to VC and D2PO

with

(b) the effects associated with batteries having structure associated with the cited references and that would include the claimed limitations with respect to VC and D2PO.

Appellant submits that the results associated with batteries having structure associated with the cited references and including the claimed limitations with respect to VC and D2PO are persuasively shown to exhibit unexpectedly superior results.

(VIII) CONCLUSION

Appellant has persuasively demonstrated that even if the Examiner has established a prima facie obviousness assertion, the demonstrated evidence of unexpectedly superior results associated with the invention rebuts the obviousness assertion. Therefore, the rejection under 35 U.S.C. §103 of the present claims over the cited reference should be withdrawn.

If this paper is not timely filed, Appellant hereby petitions for an appropriate extension of time. The fee for any such extension may be charged to Deposit Account No. 50-2866, along with any other additional fees that may be required with respect to this paper.

Respectfully submitted,

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(IX) CLAIMS APPENDIX

1. (Original) A nonaqueous electrolyte secondary battery comprising:

a negative electrode constituted of a carbonaceous material permitting reversible insertion and desorption of lithium;

a positive electrode permitting reversible insertion and desorption of lithium;

a separator separating the positive electrode and negative electrode from each other; and

a nonaqueous electrolyte composed of an organic solvent with a solute of lithium salt dissolved therein;

said nonaqueous electrolyte containing vinylene carbonate and di(2-propynyl) oxalate, and said vinylene carbonate being added in an amount of 0.1 to 3.0% by mass, and said di(2-propynyl) oxalate in an amount of 0.1 to 2.0% by mass, relative to the mass of said nonaqueous electrolyte.

2. (Original) The nonaqueous electrolyte secondary battery according to claim 1, wherein the packing density of said negative electrode active material is 1.3 g/ml or higher.

3. (Original) The nonaqueous electrolyte secondary battery according to claim 1, wherein said nonaqueous electrolyte is composed of a mixed solvent of ethylene carbonate and noncyclic carbonate.

4. (Original) The nonaqueous electrolyte secondary battery according to claim 3, wherein the proportion of said ethylene carbonate is 20 to 40% by volume of the mixed solvent.

5. (Original) The nonaqueous electrolyte secondary battery according to claim 3, wherein said noncyclic carbonate is composed of at least one item selected from ethyl methyl carbonate, diethyl carbonate and dimethyl carbonate.

6. (Original) The nonaqueous electrolyte secondary battery according to claim 5, wherein the proportion of said diethyl carbonate is 0 to 30% by volume of the mixed solvent.

7. (Previously Presented) The nonaqueous electrolyte secondary battery according to claim 1, wherein said nonaqueous electrolyte secondary battery is deployed inside a metallic case whose thickness of metal piece thereof is 0.15 to 0.50 mm.

8. (Previously Presented) The nonaqueous electrolyte secondary battery according to claim 1, wherein the mass ratio of vinylene carbonate and di(2-propynyl) oxalate is 1:20 to 30:1.

(X) EVIDENCE APPENDIX

Table 1 of filed specification of US 2004/0101762 to Noh, retrieved from PAIR

Table 1

	Organic solvent (volume %)		Additive compound		Vinylene carbonate	Vinyl sulfone
	EC/EMC/PC/FB (volume ratio, 30/55/5/10)	γ- butyrolactone (GBL)	Formula (5)	Formula (6)		
Example 1	70	30	1	2	-	-
Example 2	50	50	1	2	-	-
Example 3	30	70	1	2	-	-
Example 4	70	30	1	-	2	-
Example 5	50	50	2	1	1	-
Example 6	30	70	2	-	2	-
Example 7	30	70	3	-	1	-
Example 8	30	70	-	2	2	-
Example 9	50	50	2	-	-	0.25
Example 10	50	50	-	2	-	0.25
Comp. Example 1	30	70	-	-	-	-
Comp. Example 2	50	50	-	-	-	-
Comp. Example 3	50	50	-	-	2	-
Comp. Example 4	50	50	-	-	-	0.25
Comp. Example 5	100	-	-	-	-	-

$LiCoO_2$ having an average particle diameter of 10 μm as a positive active material, Super P (acetylene black) as a conductive agent, and polyvinylidenefluoride (PVdF) as a binder were mixed in a weight ratio of 94:3:3 in N-methyl-2-pyrrolidone (NMP) to prepare a positive slurry. The slurry was coated on an aluminum foil, dried,

(XI) RELATED PROCEEDINGS APPENDIX

n/a